

CLAIMS:

1. A system for selecting and controlling electromechanical valves to operate in at least a cylinder of an internal combustion engine, the system comprising:

a cylinder head of said cylinder having at least two regions, each region having an electromechanical valve; and

a controller to select a valve operating mode, based on an operating condition of at least an electro-magnetically actuated valve, wherein said operating mode selects at least an intake valve of said cylinder located in at least one region of said first and second region, and to operate said selected intake valve, without operating a non-selected intake valve, during a cycle of said cylinder, and to operate said non-selected intake valve during a subsequent cycle of said cylinder, without operating said selected intake valve.

2. The system of Claim 1 wherein said cylinder head of said cylinder has four regions, each region having an electromechanical valve.

3. The system of Claim 2 wherein said cylinder has two electromechanical exhaust valves operating in said third and fourth regions.

4. The system of Claim 1 wherein said cylinder head of said cylinder has five regions, each region having an electromechanical valve.

5. The system of Claim 1 wherein said cylinder head of said cylinder has three regions, each region having an electromechanical valve.

6. A system for selecting and controlling electromechanical valves to operate in at least a cylinder of an internal combustion engine, the system comprising:

5 a cylinder head of said cylinder having at least two regions, each region having an electromechanical valve; and

a controller to select a valve operating mode, based on an operating condition of at least an electro-magnetically actuated valve, wherein said operating mode selects at least an exhaust valve of said cylinder located in at least one
10 region of said first and second region, and to operate said selected exhaust valve, without operating a non-selected exhaust valve, during a cycle of said cylinder, and to operate said non-selected exhaust valve during a subsequent cycle of said cylinder, without operating said selected exhaust valve.

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7. The system of Claim 6 wherein said cylinder head of said cylinder has four regions, each region having an electromechanical valve.

20 8. The system of Claim 7 wherein said cylinder has two electromechanical intake valves operating in said first and second regions.

9. The system of Claim 6 wherein said cylinder head of said
25 cylinder has three regions, each region having an electromechanical valve.

10. The system of Claim 6 wherein said cylinder head of said cylinder has five regions, each region having an
30 electromechanical valve.

11. A system for selecting and controlling electromechanical valves to operate in at least a cylinder of an internal combustion engine, the system comprising:

5 a cylinder head of said cylinder having at least four regions, each region having an electromechanical valve; and

a controller to select a valve operating mode, based on an operating condition of at least an electro-magnetically actuated valve, wherein said operating mode selects at least
10 an intake valve of said cylinder located in at least one region of said first and second region, and to operate said selected intake valve, without operating a non-selected intake valve, during a cycle of said cylinder, and to operate said non-selected intake valve during a subsequent cycle of said
15 cylinder, without operating said selected intake valve, and to select at least an exhaust valve of said cylinder located in at least one region of said third and forth region, and to operate said selected exhaust valve, without operating a non-selected exhaust valve, during a cycle of said cylinder, and
20 to operate said non-selected exhaust valve during a subsequent cycle of said cylinder, without operating said selected exhaust valve.

12. The system of Claim 11 wherein said selected intake valve
25 and said selected exhaust valve lie in regions having adjacent sides.

13. The system of Claim 11 wherein said selected intake valve
and said selected exhaust valve lie in regions having
30 nonadjacent sides.

14. A method to control electromechanical valves in an internal combustion engine, the method comprising:

during engine operation, operating a first and a second electromagnetic intake valve in a cylinder of said engine, during a cycle of said cylinder during on a first set of electromechanical valve operating conditions; and

operating said first intake valve without operating said second intake valve during a cycle of said cylinder, and operating said second intake valve without operating said first intake valve, during a subsequent cycle of said cylinder, during a second set of electromechanical valve operating conditions.

15. A system for selecting and controlling electromechanical valves to operate in at least a cylinder of an internal combustion engine, the system comprising:

a cylinder head of said cylinder having at least two regions, each region having an electromechanical valve; and

a controller to select a valve operating mode, based on an operating condition of at least an electro-magnetically actuated valve and an operating condition of said engine, wherein said operating mode selects at least an exhaust valve of said cylinder located in at least one region of said first and second region, and to operate said selected exhaust valve, without operating a non-selected exhaust valve, during a cycle of said cylinder, and to operate said non-selected exhaust valve during a subsequent cycle of said cylinder, without operating said selected exhaust valve.

16. The system of Claim 15 wherein said cylinder head of said cylinder has four regions, each region having an electromechanical valve.

17. The system of Claim 16 wherein said cylinder has two electromechanical exhaust valves operating in said third and fourth regions.

5 18. The system of Claim 15 wherein said engine operating condition is a temperature of said engine.

19. The system of Claim 15 wherein said engine operating conditions is a temperature of a catalyst.

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20. The system of Claim 15 wherein said engine operating condition is an amount of oxidant storage capacity of a catalyst.

15 21. The system of Claim 15 wherein said engine operating condition is an amount of oxidants stored in a catalyst.

22. A computer readable storage medium having stored data representing instructions executable by a computer to control
20 an internal combustion engine of a vehicle, said storage medium comprising:

instructions to select a valve operating mode, based on an operating condition of at least an electro-magnetically actuated valve, wherein said operating mode selects at least
25 an intake valve of said cylinder located in at least one region of said first and second region, and to operate said selected intake valve, without operating a non-selected intake valve, during a cycle of said cylinder, and to operate said non-selected intake valve during a subsequent cycle of said
30 cylinder, without operating said selected intake valve.